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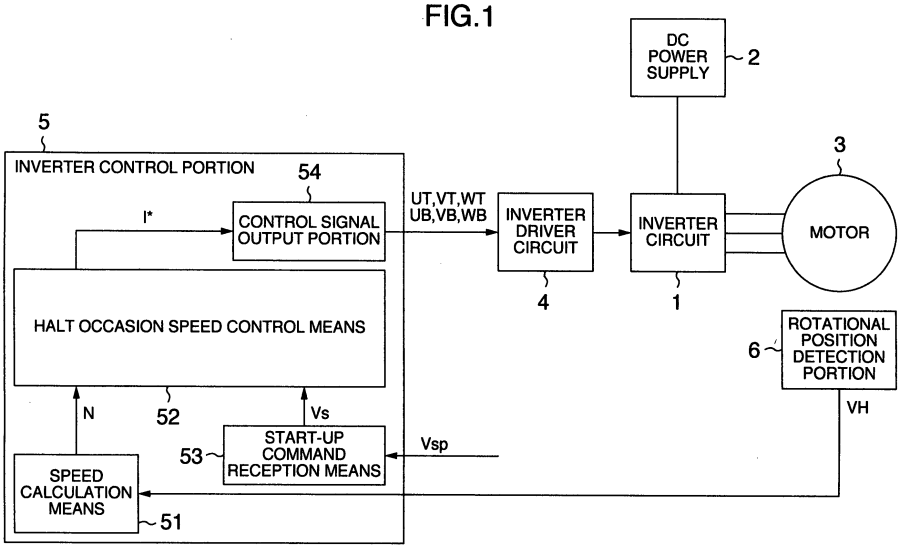
(54) Motor control apparatus

(57) A motor control apparatus for preventing overvoltages due to the induced voltage when a motor (3) is rotated by an external force under the condition where an inverter circuit (1) is inoperative. The motor control apparatus includes halt occasion speed control means (52) which can reduce the motor's rotational speed when a command for starting the inverter circuit (1) is a halt command and when the rotational speed of the motor (3) is in excess of a given value, as shown in FIG 1. Consequently, when the motor is rotated by an external force, overvoltage due to the induced voltage can be prevented by reducing the motor's speed even if the inverter circuit is not in operation.

FIG.1



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PARTIAL EUROPEAN SEARCH REPORT

under Rule 62a and/or 63 of the European Patent Convention. This report shall be considered, for the purposes of subsequent proceedings, as the European search report

Application Number
EP 10 01 4384

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D Y	JP 2007 135400 A (HITACHI LTD) 31 May 2007 (2007-05-31) * paragraph [0022] - paragraph [0023]; figures 1,5 * * paragraph [0055] - paragraph [0058] *	1,2,4 3	INV. H02P3/18 H02P6/24 H02P29/02
Y	JP 2008 206220 A (MATSUSHITA ELECTRIC IND CO LTD) 4 September 2008 (2008-09-04) * paragraph [0009] - paragraph [0011] *	3	
X	US 6 239 566 B1 (TAREILUS ALFRED [DE] ET AL) 29 May 2001 (2001-05-29) * column 6, line 56 - column 7, line 9; figure 1 *	5,7	
X	US 6 404 157 B1 (SIMON JOHN D [US]) 11 June 2002 (2002-06-11) * column 5, line 9 - line 26; figures 2,3,4A * * column 4, line 17 - line 38 * * column 5, line 26 - line 36 *	10	

TECHNICAL FIELDS SEARCHED (IPC)

H02P

INCOMPLETE SEARCH

The Search Division considers that the present application, or one or more of its claims, does/do not comply with the EPC so that only a partial search (R.62a, 63) has been carried out.

Claims searched completely :

Claims searched incompletely :

Claims not searched :

Reason for the limitation of the search:

see sheet C

Place of search	Date of completion of the search	Examiner
Munich	20 September 2017	Schürle, Patrick

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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INCOMPLETE SEARCH
SHEET C

Application Number
EP 10 01 4384

Claim(s) completely searchable:
1-5, 7, 10

Claim(s) not searched:
6, 8, 9

Reason for the limitation of the search:

In response to an invitation according to Rule 62a(1) EPC, the claims 1-5,7,10 have been searched and will be examined in the following.

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 10 01 4384

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-4

A motor control apparatus having an inverter circuit to which a DC voltage is applied, a motor connected with the inverter circuit, a rotational position detection portion for detecting a rotational position of the motor, an inverter driver circuit for driving the inverter circuit, and an inverter control portion for sending a control signal to the inverter driver circuit, said motor control apparatus comprising:speed calculation means for calculating the rotational speed of the motor from the rotational position of the motor detected by the rotational position detection portion;start-up command reception means for receiving a command for starting the inverter circuit; and halt occasion speed control means for reducing the rotational speed when the command received by the start-up command reception means is a halt command and when the rotational speed calculated by the speed calculation means is in excess of a given value.

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2. claims: 5, 7

A motor control apparatus having an inverter circuit to which a DC voltage is applied, a motor connected with the inverter circuit, a DC power supply for generating the DC voltage, an inverter driver circuit for driving the inverter circuit, and a first inverter driver circuit power supply for generating a power-supply voltage for the inverter driver circuit, said motor control apparatus comprising:a second inverter driver circuit power supply which, when the power-supply voltage supplied from the first inverter driver circuit power supply to the inverter driver circuit is cut off or reduced and the motor is rotated by an external force, generates the power-supply voltage for the inverter driver circuit from a DC voltage that is obtained by rectifying an induced voltage.

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3. claim: 10

A motor control apparatus comprising: an inverter circuit to which a DC voltage is applied; a motor connected with the inverter circuit; an inverter driver circuit for driving the inverter circuit; an inverter control portion for sending a control signal to the inverter driver circuit; an inverter control portion power supply for generating a power-supply voltage for the inverter control portion; a relay; andrelay opening-releasing means which, when the relay is open and thus the power-supply voltage for the inverter control portion is not supplied and the motor is rotated by an

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 10 01 4384

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

external force, releases the opening of the relay.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 01 4384

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-09-2017

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US 6404157 B1	11-06-2002	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82